MATERIAL SAFETY DATA SHEET

1. SUBSTANCE AND SOURCE IDENTIFICATION

National Institute of Standards and Technology
Standard Reference Materials Program
100 Bureau Drive, Stop 2300
Gaithersburg, Maryland 20899-2300

SRM Number: 3183
MSDS Number: 3183
SRM Name: Fluoride Anion Standard Solution
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Description: This Standard Reference Material (SRM) is intended as a primary standard for the quantitative determination of fluoride using anion ion chromatography (IC) or other methods. One unit of SRM 3183 consists of 50 mL of solution in a high density polyethylene bottle sealed in an aluminized bag. The solution is prepared gravimetrically to contain a known mass fraction of fluoride dissolved in filtered water.

Substance: Sodium Fluoride

Other Designations: Sodium monofluoride; villiaumite

2. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

Component:	Sodium Fluoride
CAS Number:	7681-49-4
EC Number (EINECS):	231-667-8
Nominal Mass Fraction (%):	0.1
EC Classification:	T (Toxic), Xi (Irritant)
EC Risk:	R25 (toxic if swallowed) R32 (contact with acids releases toxic gas) R36/37/38 (irritating to eyes, respiratory tract, and skin)
EC Safety:	S22 (do not breathe dust) S24/25 (avoid contact with skin and eyes) S36 (wear protective clothing) S45 (in case of accident or illness, see doctor, show label)

3. HAZARDS IDENTIFICATION

NFPA Ratings (Scale 0-4): Health = 3 Fire = 0 Reactivity = 1

Major Health Hazards: Ingestion of this material may cause severe illness. Contact may cause skin or eye irritation.

Physical Hazards: Container may break or shatter.

Potential Health Effects

Inhalation: This material causes severe irritation of the upper respiratory tract. Symptoms of exposure may include coughing, salivation, nausea, vomiting, and difficult breathing. Prolonged exposure may cause death by respiratory paralysis.

Skin Contact: This material may cause skin irritation with redness and pain. Effects may be delayed.

Eye Contact: This material may cause eye irritation and serious eye damage. Effects may be delayed.

Ingestion: This material may irritate the GI tract, causing abdominal pain, nausea, vomiting, and diarrhea. Breathing difficulty, tremors, convulsions, and coma may also occur. Prolonged exposure may be fatal; for humans, the estimated lethal dose is 5–10 g. Symptoms of chronic low-level exposure include mottled teeth, brittle bones, and anemia. Reported effects on laboratory animals include damage to the liver, kidneys, adrenal gland, teeth, bones, and stomach.

Medical Conditions Aggravated by Exposure: Diabetes insipidus, osteoporosis, and kidney disease are known or suspected risk factors. Other conditions affecting the target organs may also be aggravated by exposure. A low-calcium diet may increase the effects of fluoride exposure.

Listed as a Carcinogen/ Potential Carcinogen:

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens		X
In the International Agency for Research on Cancer (IARC) Monographs		X
By the Occupational Safety and Health Administration (OSHA)		X

4. First Aid Measures

Inhalation: Move the person to fresh air immediately. If not breathing, qualified medical personnel may start CPR or give oxygen if necessary. Get medical aid at once, and bring the container or label.

Skin Contact: Remove contaminated clothing and shoes. Flush affected skin with water for at least 15 minutes, then wash thoroughly with soap and water. Apply bandages soaked in magnesium sulfate if available. If skin irritation is severe, get medical aid and bring the container or label. Wash contaminated clothing before reusing.

Eye Contact: Remove contact lenses (if any). Do not allow victim to rub eyes or keep eyes closed. Flush eyes with large amounts of running water for at least 30 minutes, keeping eyelids open and raising lids to remove all chemical. Get medical aid at once, and bring the container or label.

Ingestion: Contact a poison control center immediately for instructions. Wash out mouth with water, but do not induce vomiting. If the person is conscious, give milk or chewable calcium tablets. Get medical aid at once, and bring the container or label.

5. Fire Fighting Measures

Fire and Explosion Hazards: This material is not flammable, but at high temperatures it may release highly toxic hydrogen fluoride gas.

Extinguishing Media: Use extinguishing media appropriate to the surrounding fire: water spray, dry chemical, carbon dioxide, or foam.

Fire Fighting: Avoid inhalation of material or combustion byproducts. Wear full protective clothing and NIOSH-approved self-contained breathing apparatus (SCBA).

Flash Point (°C): N/A

Autoignition (°C): N/A

Lower Explosive Limit (LEL): N/A

Upper Explosive Limit (UEL): N/A

Flammability Class (OSHA): N/A

Products of Combustion: Thermal decomposition of sodium fluoride can produce halogenated compounds and oxides of sodium. Hydrogen fluoride vapors may be released.

6. ACCIDENTAL RELEASE MEASURES

Occupational Release: Evacuate the spill area. Absorb spilled material using sand or other noncombustible material. Do not flush this material to a sewer or release it to the environment. Place in a suitable disposal container, observing precautions in Section 8 (Exposure Controls and Personal Protection).

Disposal: Refer to Section 13, Disposal Considerations.

7. HANDLING AND STORAGE

Storage: Store this material in the original container at room temperature. Protect from moisture, heat, and physical damage, and isolate from incompatible materials. Storage of a partially used SRM bottle is not advisable, since transpiration will increase the fluoride mass fraction. If stored, the partially used bottle should be kept in an airtight container to slow the rate of transpiration.

Safe Handling Precautions: Wear personal protective equipment as required (Section 8). Avoid contact or wash after handling.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits (Fluorine):

OSHA TWA: 2.5 mg/m^3
ACGIH TWA: 2.5 mg/m^3
UK WEL: 2.5 mg/m^3

Ventilation: Use local or general exhaust to keep employee exposures below limits. Local exhaust ventilation is preferred because it can control contaminant emissions at the source, preventing dispersion into the general work area. Refer to the ACGIH document *Industrial Ventilation, a Manual of Recommended Practices*.

Respirator: If necessary, refer to the NIOSH document *Guide to the Selection and Use of Particulate Respirators Certified under 42 CFR 84* for selection and use of respirators certified by NIOSH.

Eye Protection: Use chemical safety goggles where dusting or splashing of solutions may occur. See OSHA standard (29 CFR 1910.133) or European Standard EN166. The employer should provide an emergency eye wash fountain and safety shower in the immediate work area.

Personal Protection: Wear appropriate gloves and protective clothing to prevent contact with skin.

9. PHYSICAL AND CHEMICAL PROPERTIES

Component: Sodium Fluoride

Appearance and Odor: NaF is a white, odorless crystalline solid. Solution is clear.

Relative Molecular Weight: 42

Molecular Formula: NaF

Density (g/cm^3): 2.56 @ 41ºC

Solvent Solubility: Soluble in hydrogen fluoride; slightly soluble in alcohol

Water Solubility: Soluble (4.3% @ 25ºC)

Boiling Point (°C): 1695 (3083 ºF)

Melting Point (°C): 993 (1819.4 ºF)

pH: 7.4 (saturated solution)

NOTE: Physical and chemical data provided are for the pure crystalline form of sodium fluoride.

10. STABILITY AND REACTIVITY

Stability: __X__ Stable _____Unstable

Stable at normal temperatures and pressure.

Conditions to Avoid: Contact with incompatible materials.

Incompatible Materials: Acids, bases, and metals. This material reacts with acids to form hydrogen fluoride.

Fire/Explosion Information: See Section 5.

Hazardous Decomposition: Thermal decomposition of sodium fluoride can produce halogenated compounds and oxides of sodium. Hydrogen fluoride vapors may be released either by heat or contact with acid.

Hazardous Polymerization: _____ Will Occur __X__ Will Not Occur

11. TOXICOLOGICAL INFORMATION

Route of Entry: __X__ Inhalation __X__ Skin __X__ Ingestion

Toxicity Data:

Human, oral: TD_{Lo} = 214 µg/kg
Human, oral: LD_{Lo} = 71-75 mg/kg
Rat, oral: LD_{50} = 52 mg/kg
Human, intradermal: TD_{Lo} = 14 µg /kg

Target Organ(s): Teeth, bones, GI tract, respiratory tract, central nervous system, cardiovascular system, liver, kidneys, skin, eyes.

Mutagen/Teratogen: This material has been investigated as a mutagen and reproductive effector. Results of genetic toxicity testing have been largely negative.

Health Effects: See Section 3.

12. ECOLOGICAL INFORMATION

Ecotoxicity Data:

Fairy shrimp (*Streptocephalus proboscideus*): LC_{50} (24 hrs) = 155,363 µg/L
Western mosquitofish (*Gambusia affinis*): LC_{50} (48 hrs) = 418,000 µg/L
Fathead minnow (*Pimephales promelas*): LC_{50} (96 hrs) = 205,000 µg/L

Environmental Summary: This material is not acutely toxic to most aquatic organisms tested, but its environmental effects have not been fully evaluated. Do not release to the environment.

13. DISPOSAL CONSIDERATIONS

Waste Disposal: Dispose of container and unused contents in accordance with federal, state, and local requirements, which vary according to location. Although this material is not a listed RCRA hazardous waste, it may exhibit one or more characteristics of a hazardous waste and thus requires appropriate analysis to determine specific disposal requirements. Processing, use, or contamination of this product may change the waste management options.

14. TRANSPORTATION INFORMATION

U.S. DOT and IATA: This material is not regulated.

15. REGULATORY INFORMATION

U.S. REGULATIONS

CERCLA Sections 102a/103 (40 CFR 302.4): RQ = 1000 lbs.

SARA Title III Section 302: Not regulated

SARA Title III Section 304: Not regulated

SARA Title III Section 313: Not regulated

OSHA Process Safety (29 CFR 1910.119): Fluorine and hydrogen fluoride are regulated, but not NaF.

SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21):

ACUTE:	Yes
CHRONIC:	No
FIRE:	No
REACTIVE:	No
SUDDEN RELEASE:	No

STATE REGULATIONS

California Proposition 65: Not regulated

CANADIAN REGULATIONS

WHMIS Classification: E (corrosive), D1A (very toxic)

WHMIS Ingredient Disclosure List: Regulated (disclosure threshold 1%)

EUROPEAN REGULATIONS

EU/EC Classification: T (Toxic), Xi (Irritant)

NATIONAL INVENTORY STATUS

U.S. Inventory (TSCA): Listed

TSCA 12(b), Export Notification: Not listed

16. OTHER INFORMATION

Sources:

IUCLID Chemical Data Sheet: Sodium Fluoride. 19 February 2000.

U.S. National Institute for Occupational Safety and Health, *NIOSH Pocket Guide to Chemical Hazards*, September 2005 edition. DHHS (NIOSH) Publication No. 2005-151.